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REVISION OF THE GENUS DOASSANSIA, CORNU.

BY DR. J. B. DE TONI, N. S. D., PADUA, ITALY.

In the year 1883, the clever French mycologist, M. Cornu (*), studying some fungi belonging to *Ustilagineæ*, proposed a new genus to be named *Doassansia*, in honor of Dr. Doassans, a diligent explorer of the mycologic flora of the Pyrenees. He proposed the following generic characters:

"Fungi in planta viva parasitici; sporæ coacervatæ, incarceratæ; cortex sori cellulis simplicibus, arcte adnatis; germinatio sporarum ut in Entylomatibus coronam sporidiolorum effingit."

Several mycologists afterwards contributed to increase the species of this genus. Among them I remember especially C. Fisch, G. Winter, J. Schrœter and W. G. Farlow, so that the genus *Doassansia*, Cornu, contains about ten entities, which are, however, as Mr. Schrœter (†) justly observes, very much like each other and can scarcely be distinguished by the character of the matrix.

I have been convinced by a comparative study that the matrix must exercise a notable influence and may probably give an explanation of the involucrum (cortex sori of Cornu). The matrix of *Doassansia* is found in every species described on plants either strictly aquatic or living in very damp places (*Alisma*, *Sagittaria*, *Potamogeton*, *Limosella*, *Butomus*, *Limnanthemum*, *Hottonia*, *Comarus*, *Lythrum hyssopifolium*, *Epilobium alpinum*); we might accordingly suppose that the "cortex sori" performed the office of protecting the organs of the fungus from excessive moisture.

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* 1. M. Cornu.—Sur quelques Ustilaginees nouvelles ou peu connues. Annal. Sci. Nat. Botanique, 1883, p. 285.

† 2. J. Shrœter.—Kryptogamen Flora von Schlesien von Prof. Dr. F. Cohn, III, Pilze, p. 286. Breslau, 1887.

This tegument of strictly united cells cannot be found in true Entyloma, which otherwise perfectly correspond with *Doassansia.*

In both genera the spores produce on germinating a promycelium provided only with acrogenous sporidiola disposed like a crown and united usually in twos. *Entyloma* and *Doassansia* following Schrœter's plan of classification in his work now cited belong to Cohors *Ustilagineæ*, Family *Tilletiaceæ* and Subfamily *Tilletieæ.*

In the genus *Doassansia* the spores are either oval-globose or more or less angular, pale-colored, without (following Fisch [‡]) a true endospore and germinate in water very easily. Our genus differs from the nearly allied genus *Tubercinia*, Fr., in the tegument of the sori.

The relation I have observed between the matrix and a tegument protecting the mass of spores caused me to suspect that Rostrup's *Entyloma Hottoniæ* and Berkeley's *Protomyces Comari* must be referred to *Doassansia*, and a microscopical examination confirmed fully this suspicion. By this criterion, even Johanson's *Entyloma Catabrosæ* (||), a species living on *Catabrosa aquatica*, should belong to the genus proposed by Cornu; but I dare not affirm it, because I have seen no specimen of it.

The studies on the fungi living on aquatic plants have been somewhat neglected, so that I can make but few observations on their geographical distribution. Some species like *Doassansia Limosellæ*, Schrœt, *D. Neisslii*, De Ton., are thus far limited to Germany; *D. Cormari*, De Ton. et Massee to Great Britain; *D. Hottoniæ*, De Ton., to Denmark; *D. Cormari* (Berk) De Ton. et Massee to Great Britain; *D. Epilobi*, Farl., *D. decipiens*, Wint., *D. occulta*, Cornu, to North America; *D. Martianoffiana*, Schrœ., to Siberia and Germany; *D. Alisimatis*, Cornu, and *D. Sagittaria*, Fisch., are spread more widely; the former has been found in Italy, France, Germany, Finland, Sweden, Siberia and North America; the latter in Italy, France, Belgium, Germany, England and North and South America.

I close these short observations with many thanks to the M. Prof. P. A. Saccardo who, with his usual kindness, gave me free access to his valuable mycologic herbarium and otherwise aided me in the preparation of this paper.

1. DOASSANSIA ALISMATIS (Nees) Cornu. Sur quelques Ustilaginees nouvelles ou peu connues, p. 285, t. XVI, f. 1-4 (1883); Schrœter Pilzfl. Schles, p. 286; *Sclerotium Alismatis*, Nees., in Fr. Syst. Mycol., Vol. II, p. 257 (1822); *Perisporium Alismatis*, Fries., Syst. Mycol., Vol. III, p. 252; *Dothidea Alismatis*, Lasch., in Rabenhorst Herb. Mycol., I edit., n. 553 et II edit., n. 162; *Uredo Alismacearum*, Crouan, Fl. Finist, p. 8 (?); *Entyloma Alismacearum*, Sacc., in Michelia II, p. 44, n. 434; Mori Funghi di Modena, n. 14; *Protomyces macularis*, Fuckel., in Thum. Myc. Univ., n. 1417, non

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‡ 3. C. Fisch.—Zur Entwickelungsgeschichte von *Doassansia Sagittariæ.* Berichte der deutsch. botan. Gesellschaft, II. Berlin, 1884.

|| 4. Johanson.—Svampar fran Island. Oefversigt af Kongl. Vetenskaps. Akademisy Fœrhandlingar n. g. Stockholm, 1884.

Sacc., in Michelia, I, p. 13 (*Physoderma maculare*, Wallroth). Exsicc.:—Rabenhorst. Herb. Mycol., I edit., n. 553, II edit., n. 162; Ellis North American Fungi, n. 1485; Roumeguere Fungi Gallici Exsiccati, n. 1358; Thumen, Mycoth. Univ., n. 1417.

"Soris amphigenis, pustuliformibus, brunneis, usque ad 300 μ in diameter metientibus, utrinque prominulis, rotundatis vel ellipsoideis, rarius irregularibus, numerosis, in maculis ut plurimum determinatis orbicularibus, 4—10 mm. longis, raro subconfluentibus circinatim dispositis; sporis sphæroideis vel ovoideis obtuseque angulatis, 10-14 (rarius 18) x 8-11 μ, episporio tenui, levi, dilute brunneo donatis, plasmate pallido subhyalino fœtis; tegumento communi bene evoluto, obscure brunneo; sporidiolis longe cylindraceis, numerosis ad apicem promycelii evolutis."

Habitat in foliis *Alismatis Plantaginis* in Italia, Gallia, Germania, Suecia, Finlandia nec non Siberia occidentali, et America boreali, socio sæpe *Cylindrosporio Alismacearum*, Sacc., quocum metagenetice connexa videtur, Cfr. Saccardo Syll. Fungorum, Vol. III (Sphæropsideæ et Melanconieæ), p. 740, n. 3865.

The identity of *Uredo Alismacearum*, Crouan, with this species remains a little doubtful, because the description given in Florule de Finistere is very imperfect. "Pustules peu proeminentes, sphæriques ou ovoides, reunies en petits groupes ; spores sphæriques, jaunes; Sur la face inferieure de l'Alisma Plantago." This description could be applied also to *Physoderma maculare*, Wallr., and only a comparison with authentic specimens could decide the question. The same doubt can be raised about species of Nees. On the contrary, *Entyloma Alismacearum*, Sacc., of which I have studied several French specimens collected by the late Ab. Letendre and Italian ones collected by Prof. A. Mori near Modena, corresponds perfectly to *Doassansia Alismatis*, Cornu.

2. DOASSANSIA SAGITTARIÆ (West.) Fisch., in Berichte der deutsch, botan. Gesellsch., II, p. 405 (1884); Winter et Demetrio, Beitr. Pilzfl. Missouri ser I, n. 1; Briard Champ. nouv. Aube, n. 29; Schrœter Pilzfl. Schles, p. 286; *Uredo Sagittariæ*, Westend. Herb. crypt. Belg., n. 1177; *Physoderma Sagittariæ*, Fuckel Fungi Rhenani, n. 1549; *Protomyces Sagittariæ*, Fuckel., Symbolæ Mycologicæ, p. 75; *Protomyces Bizzozerianus*, Sacc., in Michelia, I, p. 97; Fungi Italici autogr. delineati, f. 103; *Entyloma Bizzozerianum*, Sacc., in Michelia, II, p. 135; Spegazz. Fungi Argentini, pugillus quartus, p. 21, n. 55. Exsicc :—Westendorp, Herb. crypt. belg., n. 1177; Fuckel, Fungi Rhenani, n. 1549; Sacc., Mycotheca Veneta, n. 889; Gaudoger, Fl. Gallica Exsicc, n. 744; Vize, Micro-Fungi Britannici, n. 50.

"Soris hypophyllis, pustuliformibus, flavescenti-brunneis, usque ad 100 μ in diameter metientibus, plerumque rotundatis, numerosis, subinde confluentibus, in maculis orbicularibus, 5—10 mm. latis, amphigenis, pallide flavescentibus, centro obscurioribus dispositis; sporis irregulariter globosis, subangulato-compressis, plerumque, 9—14 x 9—12 μ, episporio crassiusculo, levi, flavescenti vel hyalinulo donatis, plasmate, subtiliter granuloso foetis, rarius biguttatis; tegumento communi bene evoluto, brunneo; sporidiolis ut in specie praecedente."

Habitat in foliis *Sagittaria sagittifoliæ, variabilis et montevidensis* in Italia, Gallia, Germania, Britannia, Belgio nec non Missouri Americæ borealis et Republica Argentina, Americæ, Australis.

I have been able to ascertain the absolute identity of *Physoderma Sagittariæ*, Fuck., *Uredo Sagittariæ*, West., and *Entyloma Bizzozerianum*, Sacc., by the examination of authentic specimens. I have received a specimen of the first species taken from the classic Fuckelian collection Fungi Rhenani by the M. Prof. I. Briosi, of Pavia (to whom I am very much obliged); the typical specimens of the second and third species are contained in Prof. Saccardo's herbarium.

By a microscopic examination, I am convinced that the word "magnis," applied by Fuckel to the spores of *Physoderma Sagittariæ* must be referred to the sori, because the diameter of the spores is 10—12 μ, which agrees with the characters of Westendorp and Saccardo's species. The synonymy of *Doassansia Sagittariæ* is therefore well defined.

3. DOASSANSIA MARTIANIOFFIANA (Thum.) Schrœt. Pilzfl. Schles., p. 287 (1887); *Protomyces Martianoffianus*, Thumen.; Pilzfl. Sibiriens, II, p. 123 (1878); Berlese et De Toni Syll. Phycomyc. in Sacc. Syll. Fung. Omnium, Vol. VII, p. 320, n. 1125.

"Soris hypophyllis, subpustuliformibus, ochraceo-fuscidulis, ut plurimum, 60—80 μ in diameter metientibus, numerosis, dense gregarius, in maculis usque ad 5 mm. latis, orbicularibus, indeterminatis, haud marginatis, flavescentibus dispositis maculasque contrapositas (epiphyllas) aurantiaco-flavidulas v. fuscidulas haud limitatas efficientibus; sporis irregulariter globosis, vel elliptico-globosis, plerumque 9—11, rarius 16 μ in diameter, episporio tenui, levi, dilute brunneolo, plasmate subtiliter granuloso, pallido fœtis; tegumento communi arcte adnato, pallide colorato."

Habitat in foliis vivis fructibusque *Potamogetonis natantis et graminei* in Germania et pr. Minussinsk Sibiriæ occidentalis.

The following species (*D. occulta*, Cornu), which grows also on *Potamogeton*, is but little different.

4. DOASSANSIA OCCULTA (Hoffm.) Cornu, in Farlow's Notes on a Fungus parasitic on species of *Potamogeton*, p. 2; *Sclerotium occultum*, Hoffman; Icon. Analyt. Fungor, p. 69, t. XVI, f. 3 (1862); *Doassansia* (?) *Farlowii*, Cornu, Sur quelques Ustilaginees nouvelles ou peu connues, p. 287 (1883).

"Soris ovatis vel globosis, ovariicolis, brunneis, compressis, numerosis, sparsis, 180—200 μ longis, 140—180 μ latis; sporis (immaturis [?]) globosis, 20 μ circ. diameter, pallide coloratis, tegumento communi valde evoluto, obscure colorato."

Habitat in ovariis fructibusque maturis, *Potamogetonis natantis et lucentis* in Germania (Irmisch et Hoffmann) nec non *Potamogetonis Vaseyi, pusilli, perfoliati*, var. *lanceolati et natantis*, Ottawa Americæ borealis (J. Fletcher). The fruits are white-greenish, red-brown spotted, swelled by the fungus.

5. DOASSANSIA NIESSLII, De Ton. *Protomyces punctiformis*, Niessl. Beitr. zur Kenntn. der Pilze, p 16 (1872); Berlese et De Toni; Syll. Phycomyc. in Sacc. Syll. Fung. omnium, Vol. VII, p. 321, n. 1131; *Doassansia punctiformis* (Niessl), Schrœt. Pilzfl. Schles., p. 287 (1887), non Winter (1886).

"Soris minutissimis, punctiformibus, 50—60 μ in diameter metientibus, vix convexis, numerosis, gregariis, subepidermide (macula subnulla) nidulantibus, griseo brunneis vel melleis ; sporis subglobosis vel irregulariter angulatis, 9—11 μ in diameter, episporio levi, dilute brunneo donatis; tegumento communi parum distincto."

Habitat in foliis *Butomi umbellati*, pr. Brunn Moraviæ (Niessl) et Breslau Silesiæ (Schrœter).

I have thought necessary and convenient to change the name of this *Doassansia*, dedicating it to Mr. Niessl, the first one who illustrated it, because the late Dr. Winter, previous to the reduction of *Protomyces punctiformis*, Niessl, to *Doassansia punctiformis*, Schrœt . gave the latter specific name to a different *Doassansia* living on *Lythrum hyssopifolium*.

6. DOASSANSIA PUNCTIFORMIS, Winter. Fungi Australienses in Revue Mycologique. 1886, p. 207, non Schrœter (1887).

"Soris amphigenis, globosis, punctiformibus, minutissimus, sparsis vel subgregariis, utrinque prominulis, fuscidulis; sporis numerosis, conglobatis, rotundato-polygonis, isodiametricis, 10—12 μ in diameter, vel parum elongatis, usque ad 16 μ longis, 10 5 μ latis, episporio tenui, levi, æquali donatis, subhyalinis; tegumento communi ex uno strato parenchymatico cellularum polygoniarum, membrana crassiuscula, badia, minutissime granulata præditarum efformato."

Habitat in foliis vivis *Lythri hyssopifolii*, pr. Melbourne Australiæ (Reader).

7. DOASSANSIA LIMOSELLÆ (Kunze) Schrœter. Pilzfl. Schles, p. 287 (1887); *Protomyces Limosellæ*, Kunze in Rabenh. Fungi Europæi, n. 1694; *Entyloma Limosellae*, Winter Die Pilze, p. 115; Exsicc. Rabenhorst, Fungi Europæi, n. 1694.

"Soris plerumque hypophyllis, verruculiformibus, 60—100 μ in diameter metientibus, in maculis orbicularibus, 1—2 mm. latis, brunneolis dispositis; sporis globosis vel irregulariter sphæroideis vel oblongis sæpeve angulatis, 9—14 μ in diameter, episporio tenui, levi, inæqualiter crasso, pallide brunneo donatis; tegumento communi ut in D. Niesslii."

Habitat in foliis *Limosellæ aquaticæ* in Germania.

8. DOASSANSIA DECIPIENS, Winter. New North American Fungi in JOURNAL OF MYCOLOGY, I, p. 102 (1885).

"Soris epiphyllis, greges minutos, rotundatos irregularesve, interdum confluentes pallide fusco-luteos, in macula indeterminata luteola insidentes, 1—5 mm. in diameter metientes formantibus, punctiformibus, rotundatis vel ellipticis, plerumque dense stipatis, haud raro cofluentibus, 100—200 μ latis, immersis, fuscis; sporis numerosissimis, densissime conglobatis, rotundato-polygonis, isodiametricis vel subellipticis, sæpe

irregularibus, 10—16 μ in diameter, episporio levi donatis, pallide fuscidulis, in planta adhuc viventi germinantibus; tegumento communi tenuissimo, pseudoparenchymatico e cellulis fuscis contexto denseque applicato ; sporidiolis filiformibus, tenuissimis, sæpius flexuosis, usque ad 70 μ longis, vix 1 μ crassis."

Habitat in foliis *Limnanthemi lacunosi*, pr. Green Pond, Morris Co., N. Y., Americæ borealis (E. A. Rau).

9. DOASSANSIA EPILOBII, Farlow in Botanical Gazette, 1883, p. 277; Crypt. Flora White Mountains, p. 239. Exsicc.:—Ellis, North American Fungi, n. 1186.

"Sori globosis vel confluendo lobulatis, 80—200, rarius 250 μ in diameter metientibus, amphigenis, prominulis, plerumque ad apices foliorum gregatim collectis, in maculis sive areis pallide flavescentibus dispositis; sporis e globoso irregulariter polyhedricis, 7. 5—17 (plerumque 10—14 μ) in diameter, dense congestis, episporio tenuiusculo, levi donatis, pallide coloratis; tegumento communi e cellulis crasse tunicatis, atro-brunneis efformato."

Habitat in foliis *Epilobii alpini* ad margines torrentis "King's Ravine" in America boreali (Farlow).

10. DOASSANSIA HOTTONIÆ (Rostr.) De Ton. *Entyloma Hottoniæ*, Rostrup in Thumen Mycotheca Universalis, n. 2222. Exsicc.:—Thumen, Mycoth. Univ., n. 2222.

"Soris hemisphæricis, gregariis, rufescentibus, 80—200 μ in diameter, raro oblongis; sporis rotundato-angulatis, 9—14 μ in diameter, episporio tenui, levi donatis, dilute fuscidulis; tegumento communi arcte adnato, distincte evoluto, brunneo."

Habitat in foliis vivis *Hottoniæ palustris*, pr. Skarup ins. Fioniæ in Dania (Rostrup et Johanson).

11. DOASSANSIA COMARI (Berk. et Br.), De Ton. et Massee in Herb. Kewensi; *Protomyces Comari*, Berk. et Broome in Ann. Nat. Hist., No. 1708; Berlese et De Toni, Syll. Phycomyc. in Sacc. Syll. Fung. omnium, Vol. VII, p. 321, No. 1135.

"Soris gregariis vel sparsis, siccitate atris, 1—1.5 mm. in diameter, metientibus; sporis late ellipticis, 10 x 7 μ, levibus, in sicco dilute vinosis, tegumento communi bene evoluto."

Habitat in foliis *Comari palustris*, pr. Forfar Britanniæ.

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